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Title of the Invention

# GLIDING OR ROLLING BOARD

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## CROSS-REFERENCE TO RELATED APPLICATION

**[0001]** This application is based upon French Patent Application No. 03.01021, filed January 27, 2003, the disclosure of which is hereby incorporated by reference thereto in its entirety and the priority of which is hereby claimed under 35 U.S.C. §119.

## BACKGROUND OF THE INVENTION

1. Field of the Invention

**[0002]** The invention relates to the field of gliding boards adapted to snowboarding or water surfing, skiing or water skiing, skateboarding or the like.

2. Description of Background and Relevant Information

**[0003]** A board traditionally has a length measured along a longitudinal direction between a first end and a second end, a width measured along a transverse direction between a first edge and a second edge, and a height measured between a gliding or rolling surface and a receiving surface.

**[0004]** The board has, from the first end to the second end, a first end zone, a central zone, and a second end zone.

**[0005]** Lastly, the board has a sandwich construction, formed by a first reinforcement and a second reinforcement between which a first core is arranged. The reinforcements give the board its main mechanical properties, and the core acts as a filler between the

reinforcements. Other board constructions having one or several reinforcements can be envisioned.

**[0006]** The user, or rider, biases the board in order to steer it. This is particularly the case when snowboarding, for example, when the board is supported on an edge on a slope. For the purpose of initiating a turn, the rider can shift the center gravity of his/her body toward one end. Under the effect of the user's weight, this end tends to be pressed against the ground and to glide along the slope.

**[0007]** At the same time, the other end still grips the ground in the area of the edge. The board is torsionally deformed in a reversible manner along a substantially longitudinal axis. Because one end glides along the slope and the other does not glide, the board turns to take the turn.

**[0008]** It became apparent that it is not always easy to steer the board by torsionally deforming it, as with engaging a turn. A rider that is relatively light in weight cannot bias the board as substantially as a rider that is heavier. In addition, a relatively short rider cannot shift his center of gravity as much as a taller rider. A board edge does not become engaged in the same manner depending upon the tilting of the slope.

## SUMMARY OF THE INVENTION

**[0009]** One of the objects of the invention is to facilitate the steering of the board, particularly when engaging, or initiating, turns.

**[0010]** To this end, the invention proposes a gliding or rolling board having a length measured along a longitudinal direction between a first end and a second end of the board, a width measured along a transverse direction between a first edge and a second edge, and a height measured between a gliding surface and a receiving surface, the board

having in height at least one first reinforcement, the board having, from the first end to the second end, a first end zone, a central zone, and a second end zone.

**[0011]** In the central zone the board according to the invention at least one of the reinforcements has at least a portion whose structure is mechanically weakened with respect to the remainder of the reinforcement structure.

**[0012]** The weakening of a reinforcement structure allows for a more substantial deformation of the board for a given bias, or provides the same amount of deformation for a slight bias. Thus, it is easier to deform the board through biases. It is particularly easier to cause its reversible torsion in order to engage a turn.

**[0013]** As a result, the steering of the board is easier.

## BRIEF DESCRIPTION OF DRAWINGS

**[0014]** Other features and advantages of the invention will be better understood by means of the following description, with reference to the attached drawings showing, by way of non-limiting examples, how the invention can be embodied, and in which:

FIG. 1 is a perspective view of a board according to a first embodiment of the invention;

FIG. 2 is a cross-section along the line II-II of FIG. 1;

FIG. 3 is a cross-section along the line III-III of FIG. 1;

FIG. 4 is a partial cross-section similar to that of FIG. 3, for a second embodiment of the invention;

FIG. 5 is a partial cross-section similar to that of FIG. 3, for a third embodiment of the invention;

FIG. 6 is a perspective view of a board according to a fourth embodiment of the invention;

FIG. 7 is a cross-section along the line VII-VII of FIG. 6;

FIG. 8 is a cross-section along the line VIII-VIII of FIG. 6;

FIG. 9 is a schematic transverse cross-section of a manufacturing mold of the board according to the fourth embodiment.

## DETAILED DESCRIPTION OF THE INVENTION

**[0015]** Although the various embodiments to which this detailed description is directed relate to a snowboard, it is to be understood that the invention also encompasses other boards that are adapted to sporting activities, such as those mentioned above.

**[0016]** The first embodiment is described hereinafter with reference to FIGS. 1-3.

**[0017]** As known and as seen particularly in FIG. 1, a snowboard 1 has a length measured along a longitudinal direction L between a first end 2 and a second end 3. The board 1 also has a width measured along a transverse direction between a first lateral edge 4 and a second lateral edge 5, as well as a height measured between a gliding surface 6 and a receiving surface 7, i.e., a rider support surface.

**[0018]** The transverse direction, for the purpose of this description, is perpendicular to the longitudinal direction L, and it is parallel, or generally parallel, to the gliding surface 6.

**[0019]** The board 1 also has, from the first end 2 to the second end 3, a first end zone 8, a first contact line W1, a central zone 9, a second contact line W2, and a second end zone 10. The central zone 9 itself successively has, between the contact lines W1, W2, a first intermediary zone 15, a first retention zone 16, a second intermediary zone 17, a second retention zone 18, and a third intermediary zone 19.

**[0020]** Each retention zone 16, 18 is provided to receive a device for retaining a user's boot, i.e., a binding. The devices, not shown, can be affixed to the board 1 by a means such as screws. To this end, each retention zone 16, 18 is provided with threaded orifices 20.

**[0021]** Each of the contact lines W1, W2 is a line that is substantially transverse to the board 1, in the area of which the gliding surface 6 touches a planar surface when the board 1 rests on the surface without an outside influence.

**[0022]** The height of the board 1 is seen in cross-section in FIGS. 2 and 3.

**[0023]** From the gliding surface 6 to the receiving surface 7, the board 1 has a sole 21, a first reinforcement 22, a core 23, a second reinforcement 24, and a protective layer 25.

**[0024]** Depending on the type of board, the number of reinforcements can be modified and be less or greater than two.

**[0025]** The sole 21 is manufactured, for example, with a plastic material containing polyethylene. The protective layer 25 is manufactured, for example, with a plastic material containing an acetyl-butadiene-styrene.

**[0026]** Each of the reinforcements 22, 24 is preferably made from resin-impregnated, or resin-reinforced, fibers. The fibers can be made from any material, or with any mixture of materials, such as glass, carbon, aramid, metal, or other material. The core 23 has a low-density material, such as wood or a foam made of a synthetic material, which gives it a reduced mass. The simultaneous use of wood and foam is also possible.

**[0027]** The reinforcements 22, 24 and the core 23 form a sandwich panel that extends along at least 50% of the surface of the board, and preferably substantially along the entire surface. This makes the structure of the board homogenous.

**[0028]** In the central zone 9, according to the invention, at least one of the reinforcements 22, 24 has at least a portion whose structure is mechanically weakened with respect to the rest of the reinforcement structure. The weakening facilitates the reversible deformations of the board 1.

**[0029]** According to the first embodiment of the invention, as it is understood by means of FIGS. 1 and 3, it is the second reinforcement 24 that has a first portion 30 whose structure is mechanically weakened. The first portion 30 is contained in the second intermediary zone 17, between the retention zones 16, 18. The first portion 30 extends substantially along the entire second intermediary zone 17, from the first 4 to the second 5 lateral edge and between the two series of threaded orifices 20. This localization of the weakening facilitates the reversible deformations between the retention zones 16, 18 and, consequently, between the user's feet.

**[0030]** The mechanical weakening of the first portion 30 is made by reducing the quantity of material within the second reinforcement 24. The reduction of material is obtained by removing material, for example, by machining. It therefore suffices to use a traditional reinforcement to manufacture the board 1, then to machine the board, for example, by means of a saw or cutter. The protective layer 25 is machined at the same time as the reinforcement. This technique has the advantage of being simple.

**[0031]** Any other technique could be suitable. For example, it could be provided to cut out the reinforcement 24 before assembling the constitutive elements of the board.

**[0032]** According to the first embodiment of the invention, the reduction of material occurs by grooving.

**[0033]** In a non-limiting manner, the second reinforcement 24 has a first groove 31 located in proximity to the first lateral edge 4, a second groove 32 located substantially halfway between the lateral edges 4, 5, and a third groove 33 located substantially in proximity to the second lateral edge 5. Each of the grooves 31, 32, 33 has a substantially linear form, and is oriented substantially along the longitudinal direction L of the board 1.

**[0034]** This arrangement slightly reduces the area of the reinforcement 24 in the transverse direction; however, it reduces it much more in the longitudinal direction. As a result, the board 1 substantially maintains its resistance to flexion, along a transverse axis, in the second intermediary zone. Nevertheless, the board 1 loses some resistance to torsion, in the second intermediary zone, along a longitudinal axis. It is therefore easier to twist it along the longitudinal axis. In steering, this translates into an increased capability to tilt the retention zones 16, 18 or the first 15 and third 19 intermediary zones differently, one with respect to the other. As a result, a shifting of the user's center of gravity toward one end 2, 3 allows for a better gliding of one of the ends 2, 3 combined with a better grip of the other of the ends. It is easier for the board 1 to take curves.

**[0035]** A groove can have a length between 5 and 50 centimeters, a width between several tenths of a millimeter and several centimeters, and a depth between several tenths of a millimeter and several millimeters.

**[0036]** Each groove 31, 32, 33 crosses through the reinforcement 24, but this is not necessary.

**[0037]** According to the invention, a groove 31, 32, 33 has a square or rectangular cross-section, but any other form, for example, a rounded form, could be suitable.

**[0038]** Lengthwise, each groove can be linear or non-linear. For example, a groove can be longitudinally curved inward, have a succession of straight segments, albeit off-set between themselves, or have portions that are both curved inward and straight.

**[0039]** The number of grooves shown, i.e., three, is not limiting. More or fewer than three grooves can be provided.

**[0040]** The grooves can have lengths that are identical or different one with respect to the others.

**[0041]** It could be provided for several grooves to be separate and aligned.

**[0042]** As seen clearly in FIG. 3, three fittings 34, 35, 36 line the three grooves 31, 32, 33, respectively. Each fitting extends opposite the protective layer 25, the second reinforcement 24, and the core 23. Each fitting improves the finish of the receiving surface 7. Each fitting 34, 35, 36 makes the structure of the board 1 impermeable, specifically by avoiding water infiltrations between the core 23 and the reinforcement 24.

**[0043]** A fitting 34, 35, 36 can be made, for example, from a plastic material, such as an acetyl-butadiene-styrene, a polyurethane, or other material.

**[0044]** The fitting 34, 35, 36 is added to the structure of the board 1, by means of an adhesive or glue, glue making the groove 31, 32, 33 impermeable. However, another technique can be provided, such as the one using a flexible fitting forcibly mounted and forming a seal.

**[0045]** A fitting 34, 35, 36 can be provided to have a U-shaped cross-section that is solid, hollow, or otherwise. This reduces or prevents the groove 31, 32, 33 from being filled with snow. In any case, it also allows for absorbing vibrations.

**[0046]** The other embodiments of the invention are described hereinafter. For reasons of convenience, it is primarily their characteristics with respect to the first embodiment that are shown and described.

**[0047]** The second embodiment is shown in FIG. 4.

**[0048]** A board 50 is formed in height by a laminated stack that includes a sole 51, a first reinforcement 52, a core 53, a second reinforcement 54, and a protective layer 55. According to the invention, a groove 56 is provided on the top of the board 50, through the protective layer 55, the second reinforcement 54, and a portion of the core 53. Compared to the first embodiment, a fitting 57 extends only along the length of the core in order to form the bottom of the groove 56, by being flush with the second reinforcement 54 on the side of the core 53.

**[0049]** The structure of the board presented hereinabove allows for a manufacturing according to the following.

**[0050]** The core 53 is formed by itself and has the fitting 57. Next, the previously mentioned stack is formed and arranged in a mold. An increase in temperature and pressure affixes the constitutive elements of the board 50 together. Lastly, the groove 56 is made by removing material, for example, by machining. According to this method of manufacturing, the fitting 57 is positioned during an intermediary step. The fitting 57 can be machined at the same time as the groove 56, but it can be non-machined.

**[0051]** The third embodiment is shown in FIG. 5.

**[0052]** A board 70 is formed in height by a stack that includes a sole 71, a first reinforcement 72, a core 73, a second reinforcement 74, and a protective layer 75. According to the invention, a groove 76 is provided underneath the board 70, through the

sole 71 and the first reinforcement 72. The groove 76 is plugged by a fitting 77 that specifically prevents water infiltration. The fitting can be made with a material that is identical or similar to the one constituting the sole 71. This preserves the aptitude of the sole 71 for gliding. The technical effects obtained by a weakening of the first reinforcement 72 are similar to those obtained by a weakening of the second reinforcement.

**[0053]** The fourth embodiment is shown in FIGS. 6-9.

**[0054]** As seen in FIG. 6, a board 90 has a first end 91, a second end 92, a first lateral edge 93, a second lateral edge 94, a gliding surface 95, and a receiving surface 96.

**[0055]** The board 90 has a first end zone 97, a first contact line W3, a central zone 98, a second contact line W4, and a second end zone 99.

**[0056]** In the central zone 98, the board 90 has a first intermediary zone 105, a first retention zone 106, a second intermediary zone 107, a second retention zone 108, and a third intermediary zone 109. Each of the retention zones 106, 108 has threaded orifices 110.

**[0057]** As shown in FIGS. 7 and 8, the board 90 has in height a sole 111, a first reinforcement 112, a core 113, a second reinforcement 114, and a protective layer 115.

**[0058]** Here again in the central zone 98, according to the invention, at least one of the reinforcements 112, 114 has at least a portion whose structure is mechanically weakened with respect to the rest of the reinforcement structure. The weakening facilitates the reversible deformations of the board 90.

**[0059]** According to the fourth embodiment of the invention, as understood by means of FIGS. 6 and 8, it is the second reinforcement 114 that has a first portion 120 whose

structure is mechanically weakened. The first portion 120 is contained in the second intermediary zone 107, between the retention zones 106, 108. The first portion 120 extends substantially along the entire second intermediary zone 107, from the first 93 to the second 94 lateral edge and between the two series of threaded orifices 110. This localization of the weakening facilitates the reversible deformations between the retention zones 106, 108 and, consequently, between the rider's feet.

**[0060]** The second reinforcement 114 has grooves 121 that give the first portion 120 its mechanical weakening.

**[0061]** Each groove 121 reduces the thickness of the reinforcement 114 in the area in which it extends.

**[0062]** The grooves 121 are oriented substantially longitudinally with respect to the board 90. Certain grooves are close to a lateral edge 93, 94 of the board, others are between the edges 93, 94.

**[0063]** The grooves 121 can have different lengths, different depths and different forms.

**[0064]** As seen clearly in FIG. 8, the grooves 121 have rounded shapes. This avoids, or at least reduces, the risks of rupture of the reinforcement 114 from starting. Nevertheless, other groove forms could be used.

**[0065]** As seen clearly in FIG. 6, the arrangement of the grooves 121 occurs along a pattern reminiscent of the form of a diabolo. This arrangement is exemplary and any of other arrangements could be used.

**[0066]** The board 90 can be manufactured in a manner understood with reference to FIG. 9.

**[0067]** The sole 111, the first reinforcement 112, the core 113, the second reinforcement 114, and the protective layer 115 are stacked in a mold 130. The latter has a base 131 and a cover 132. The closure of the mold 130, its pressurizing, and its increase in temperature give the board 90 its cohesion. Tongues, or strips, 133 provided in the cover of the mold 130 shape the grooves 121. In the area in which a tongue 133 presses, the reinforcement 114 is deformed to make room for a groove 121. This phenomenon occurs because the tongues 133 exert a high pressure, in the manner of a knife, in the material to be cut. In addition, before it is solidified, the reinforcement 114 is easily deformable. Indeed, the reinforcement 114 is a mixture of viscous resin and fibers. Thus, a localized excess pressure forms a groove 121 by causing the fibers to be displaced in the reinforcement 114 before it becomes solidified. The fibers are pushed to both sides of the groove 121.

**[0068]** It was noted that the protective layer 115 conforms naturally to the form of the reinforcement 114, by maintaining a substantially constant thickness.

**[0069]** The structure of the grooves 121 slightly reduces the area of the reinforcement 114 in the transverse direction, but it reduces it more in the longitudinal direction. As a result, the board 90 substantially maintains its resistance to flexion, along a transverse axis, in the second intermediary zone 107. Nevertheless, the board 90 loses some resistance to torsion in the second intermediary zone 107, along a longitudinal axis. It is therefore easier to twist it along the longitudinal axis. This further improves the taking of the curve by the board 90.

**[0070]** For all of the examples, the invention is made from materials and according to techniques of embodiment known to one skilled in the art.

**[0071]** The invention is not limited to the particular embodiments described hereinabove, and includes all equivalent embodiments that come within the scope of the following claims.

**[0072]** In particular, for any board, it is provided to weaken either the first reinforcement or the second reinforcement, or even both of them.

**[0073]** The weakening techniques can be standardized or diversified on the same board.

**[0074]** A weakened portion can extend in a retention zone, or beyond the retention zone.

**[0075]** The invention is not limited to a snowboard, but can be applied to any gliding or rolling board for which identical or similar problems must be resolved.